

## HANSEN TECHNOLOGIES CORPORATION



Transducer Probe with Digital Readout

### INTRODUCTION

Hansen **Techni-Level**<sup>®</sup> level transducer probes have fast become the industry standard for liquid refrigerant level control and monitoring. These reliable, well engineered electronic level transducer probes, when properly used, operate trouble-free and are not affected by reasonable changes in refrigerant temperature or pressure. They provide a computer compatible 4-20 mA (milliampere) output signal proportional to liquid level. Probes consist of a compact, electronic transmitter in a watertight housing assembled on top of a rugged, capacitance type level sensor. Probe active lengths up to 125" (3050 mm) are available. Normally, the probe must be inside of a level column. Typical applications include: vertical and horizontal vessels, pump accumulators, pilot receivers and refrigerant loss monitoring.

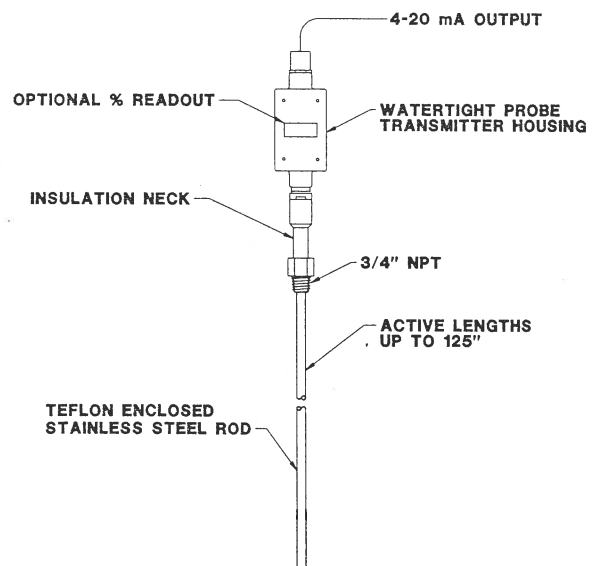
### Specifications, Applications, Service Instructions & Parts

#### VLT 4-20 mA Techni-Level<sup>®</sup> LEVEL TRANSDUCER PROBES

for use in 4-20 mA control loops  
for refrigerant level control  
and monitoring



### KEY FEATURES



### ADDITIONAL FEATURES

Specifically designed for refrigeration systems  
Compact, solid-state transmitter and watertight housing are located on top of probe sensor  
Computer compatible, 2-wire 4-20 mA signal  
Connectable to plant computer, PLC or other device  
Rugged probe sensor design  
Electrically isolated output  
Remote display of level possible  
Suitable for ammonia, R22, R134a and other approved refrigerants

## SPECIFICATIONS

Signal Output: 2-wire 4-20 mA, D.C., isolated  
Input Power: 12 to 36 volt D.C., regulated,  
to be available at the probe  
Maximum Load Resistance: 1200 ohms  
Classification: Transmitter type/class 2U ANSI/ISA-S50.1  
Enclosure: Watertight NEMA 4 (IP65)  
Fitting: 3/4" NPT male, connection to Level Column  
Standard Active Probe Lengths: 20", 30", 40", 60",  
80", 100", 120"; Custom Lengths: Up to 125"  
Safe Working Pressure: 400 PSIG (27 bar) SWP  
Operating Temperature:  
Transmitter: -20F to 120F ambient (-30 to +50°C)  
Sensor: -60F to 150F (-50F to +65°C)  
Below -60F (-50°C) requires optional stainless  
steel extended neck body; contact factory.

## LEVEL COLUMN

Body: 3" Schedule 40 pipe, standard  
Sight Glass: Located at 50% level, standard  
Safe Working Pressure: 400 PSIG (27 bar) SWP  
Operating Temperature: -60F to 240F (-50 to +115°C)

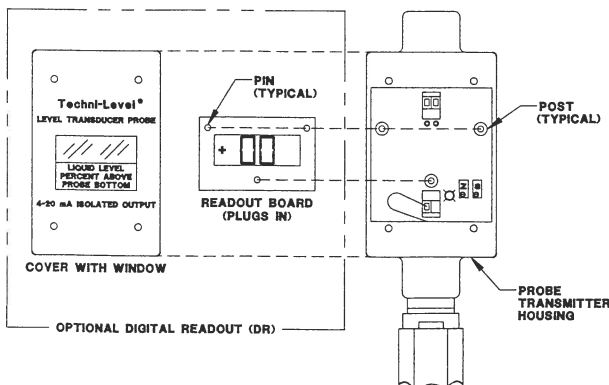
## ADVANTAGES

These probes are shipped factory pre-calibrated and tested on a refrigeration system. They have internal dampening to avert false alarms triggered by normal turbulence and splashing of refrigerant. The optional digital readout enables the plant operator to easily know the refrigerant level at a glance. The 4-20 mA signal is commonly used with computers, programmable controllers, and other accessories; it can also be easily converted to a 1 to 5 volt or 2 to 10 volt D.C. signal.

## OPTIONAL DIGITAL READOUT

Transducer probes can be factory or field fitted with an internal LCD digital readout. This readout is visible through a clear window in the cover of the watertight probe housing. It is internally powered and displays percentage of immersed probe active length. Ambient temperature range for the LCD readout is 32F to 120F (0° to 50°C). Specify the DR suffix when ordering probe; Example: To order a 20" active length probe with built-in digital readout, catalog number VLTDR.02. For field addition order kit number 77-1004.

### INSTALLATION OF OPTIONAL DIGITAL READOUT FOR TRANSDUCER PROBES



## REMOTE DISPLAY

A milliampere meter may be inserted in series with the 4-20 mA control loop to facilitate localized indication of the liquid level. (See wiring diagram on page 3). This may be an analog milliampere meter or another component, such as a digital process meter.

## INSTALLATION

Level columns are required in applications where refrigerant evaporation occurs within the vessel being monitored; such as flooded evaporators, low side vessels or accumulators. Using a level column (typically 3" diameter) separates the probe sensor from the boiling which occurs in the vessel. Therefore, true refrigerant liquid level is being measured, not surges of bubbling liquid. Level columns can be supplied by Hansen or fabricated in the field. See page 4 for level column details and dimensions. When refrigerant temperature is lower than ambient, insulating the level column is essential.

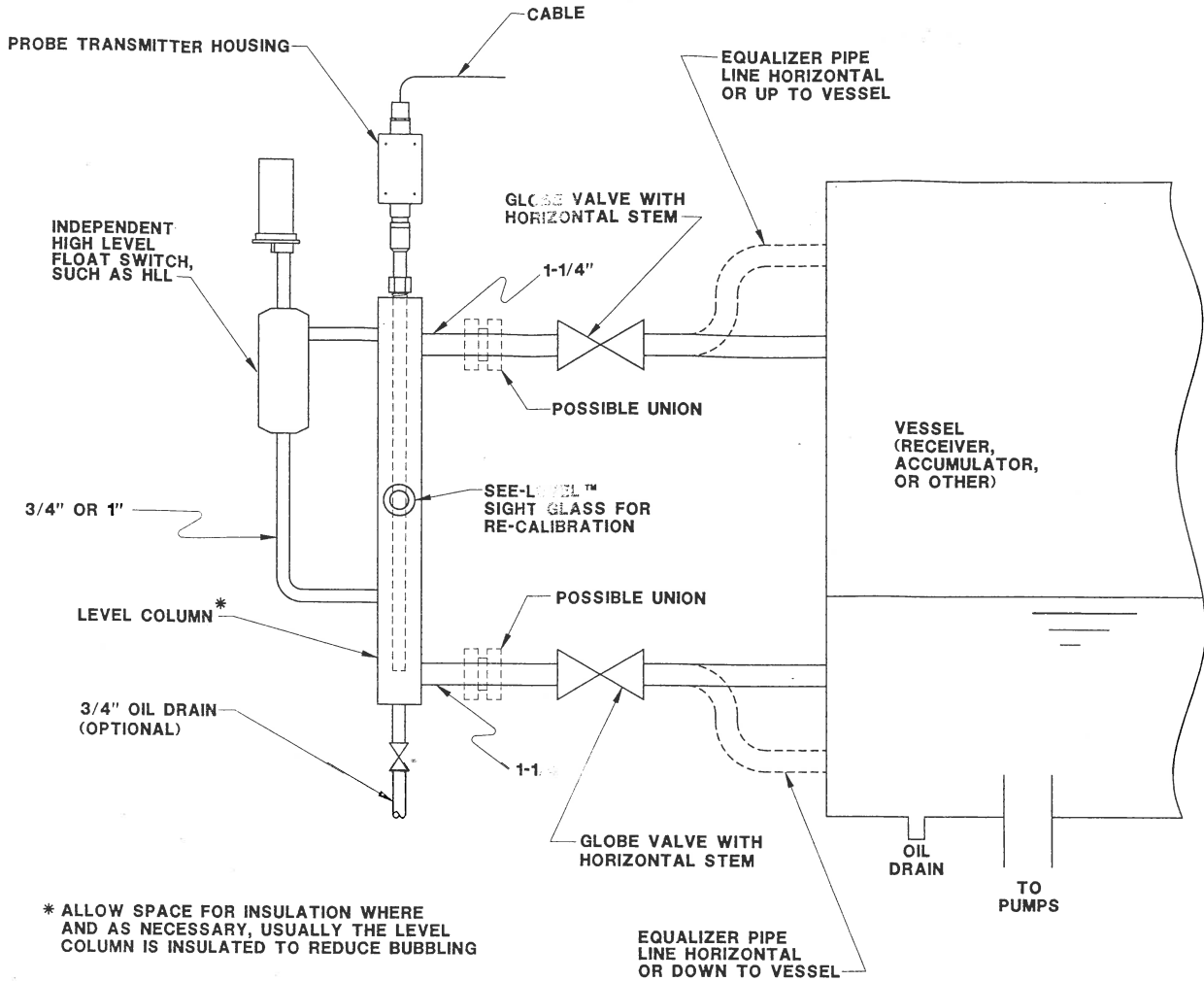
Adequate vertical distance for probe insertion should be provided above the 3/4" FPT opening on the column. If overhead space is not available, a level column with flanged connections and shut-off valves may be used. Follow good piping practice and refrigeration system maintenance to avoid oil accumulation inside the level column. Equalizer lines and valves should be positioned as shown in the Level Column Piping Installation diagram on page 3. It is recommended that a high level float switch cut-out be installed whenever practical. This provides a non-adjustable safety in case of an accidental, incorrect, high level setting or failure of the high level control relay or interface device.

On halocarbon systems, over a period of time, the refrigerant in the level column will become oil rich. An extremely high concentration of oil may cause the original calibration to become offset, thus causing a false reading of refrigerant level. To prevent this, periodically remove oil from the level column.

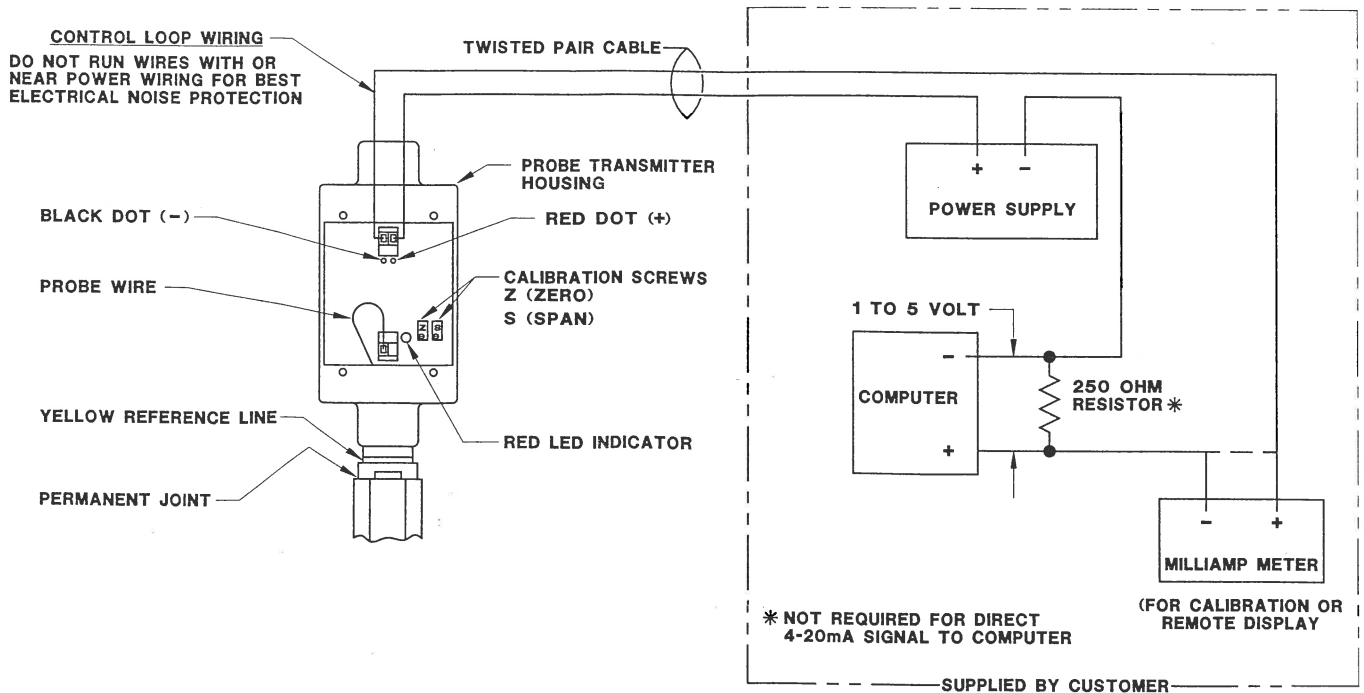
Remove probe from packing crate being careful not to bend the probe sensor. Insert probe into the top opening of the level column. Use non-electrically isolating pipe thread sealant (do not use teflon tape) on 3/4" MPT fitting on probe and insert in top of level column. Tighten probe on hex; do not grip probe housing. Pressure test for leaks. Fifty feet (15 meters) of 2-wire twisted pair cable is supplied with probe. Longer lengths may be ordered or else use ordinary 20 AWG wire. Connect probe transmitter to control loop wiring per wiring diagram on page 3. Do not run control loop wiring with or near power wiring. For maximum physical and electrical protection run control cable inside separate metal conduit. If conduit is used, seal inside of connection to prevent water or other contaminants from running into probe housing.

# LEVEL COLUMN PIPING INSTALLATION

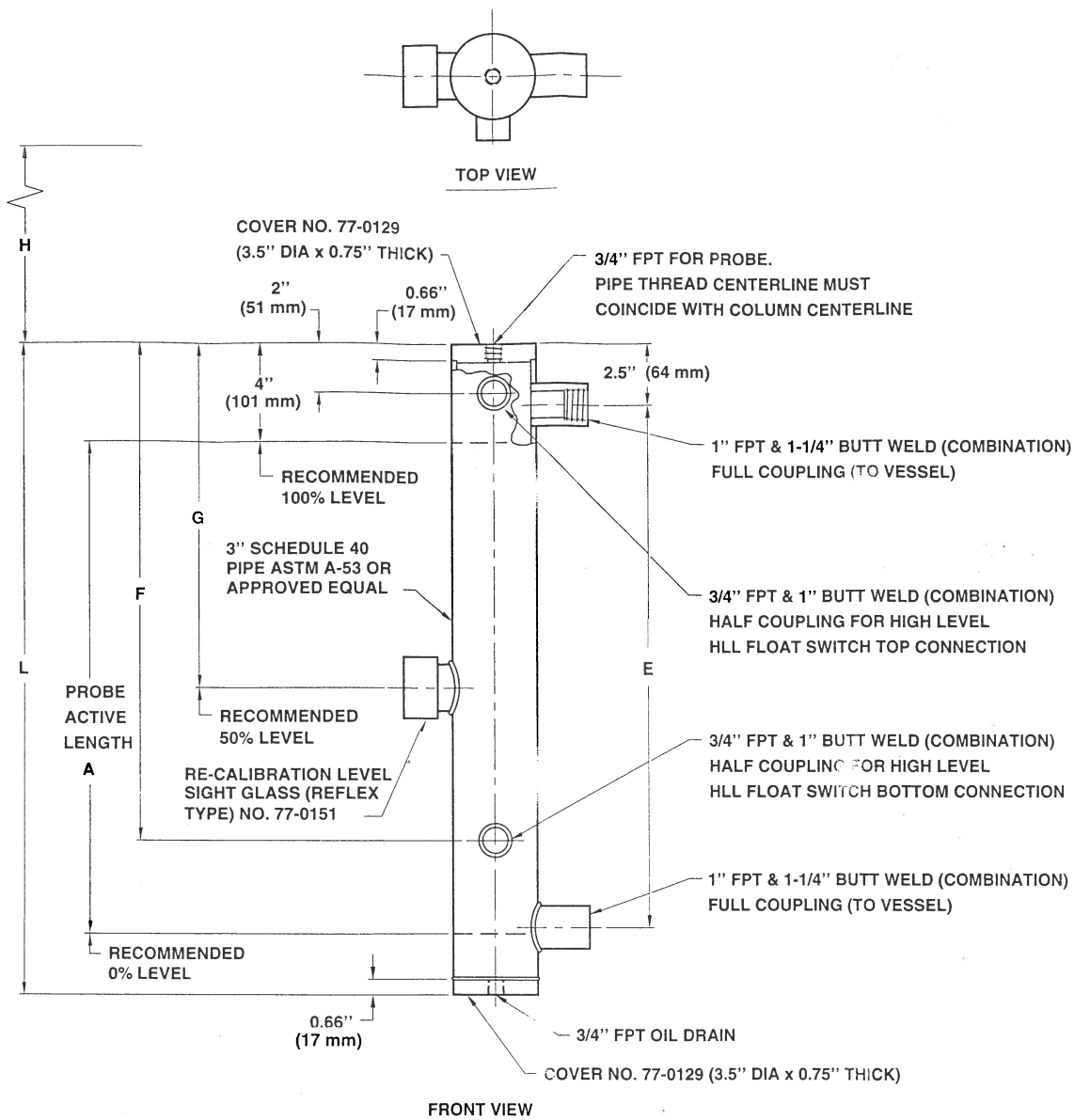
(Schematic only, not for construction)



# TYPICAL WIRING



# LEVEL COLUMN DIMENSIONS

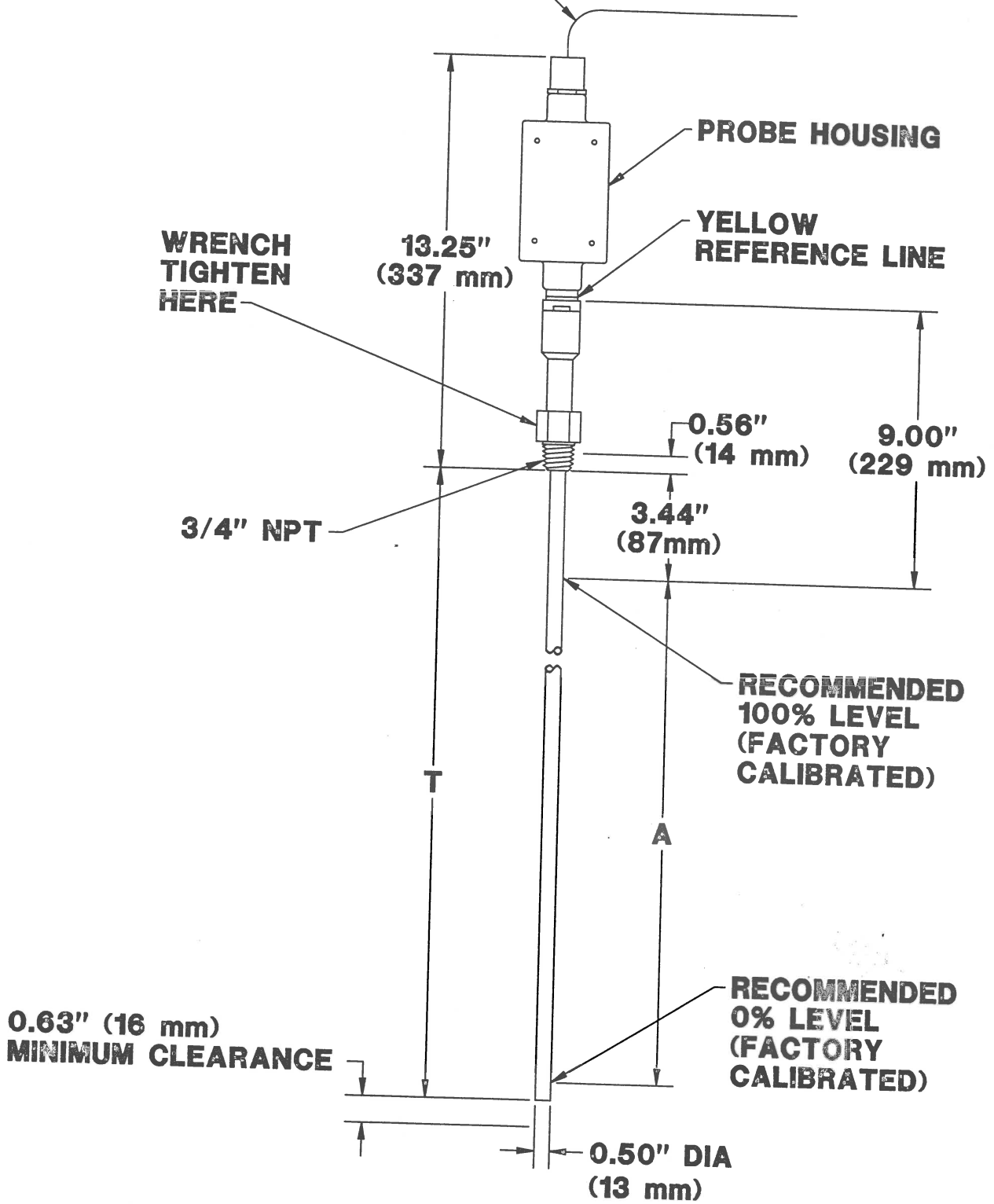


COMPLETE LEVEL COLUMN OR PARTS THEREOF AVAILABLE FROM HANSEN TECHNOLOGIES.  
 PLUGS ARE SUPPLIED IN THE 3/4" OIL DRAIN AND TWO HIGH LEVEL FLOAT SWITCH CONNECTIONS.

CATALOG NUMBER	UNITS	PROBE ACTIVE LENGTH	EQUALIZER LEGS	FLOAT SWITCH LEG	SIGHT GLASS LOCATION	PROBE REMOVAL HEIGHT	COLUMN OVERALL LENGTH
		A	E	F	G	H	L
LC.02	INCHES	20"	21.25"	18.5"	14"	40"	26.5"
	MM	510	540	470	356	1016	673
LC.03	INCHES	30"	31.25"	31.125"	19"	50"	36.5"
	MM	760	794	791	483	1270	927
LC.04	INCHES	40"	41.25"	36.125"	24"	60"	46.5"
	MM	1020	1048	918	610	1524	1181
LC.06	INCHES	60"	61.25"	46.125"	34"	80"	67.25"
	MM	1525	1556	1172	864	2032	1708
LC.08	INCHES	80"	81.25"	56.125"	44"	100"	87.25"
	MM	2030	2064	1426	1118	2540	2216
LC.10	INCHES	100"	101.25"	66.125"	54"	120"	107.25"
	MM	2540	2572	1680	1372	3048	2724
LC.12	INCHES	120"	121.25"	76.125"	64"	140"	127.25"
	MM	3050	3080	1934	1626	3556	3232

**PROBE DIMENSIONS**

**50 FEET (15 m) OF CABLE**



<b>A (ACTIVE LENGTH)</b>	INCHES	20"	30"	40"	60"	80"	100"	120"
	MM	510	760	1020	1525	2030	2540	3050
<b>T (INSERTION LENGTH)</b>	INCHES	24.25"	34.38"	44.5"	64.69"	84.81"	105"	125"
	MM	616	873	1130	1643	2154	2667	3175

## TROUBLE-SHOOTING

PROBLEM	CAUSE	ACTION
Red L.E.D. indicator not lit.	<ol style="list-style-type: none"> <li>1. No power to probe housing or wrong voltage.</li> <li>2. Moisture in probe housing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage at terminals in the probe housing.</li> <li>2. See Note 1 below.</li> </ol>
Does not indicate level changes.	<ol style="list-style-type: none"> <li>1. Fault in control loop wiring.</li> <li>2. No continuity between probe and level column. To test, temporarily install wire from probe housing cover screw to level column and observe for changes.</li> <li>3. Moisture in probe housing.</li> <li>4. Equalizer valves closed.</li> <li>5. Probe wire loose.</li> <li>6. Equalizer lines clogged with oil or debris.</li> <li>7. Poor pipe connection between level column and vessel.</li> </ol>	<ol style="list-style-type: none"> <li>1. See Note 2 below.</li> <li>2. Check for teflon tape or other non-conductive pipe sealant at probe-to-column connection; replace sealant.</li> <li>3. See Note 1 below.</li> <li>4. Open valves.</li> <li>5. Open probe housing cover and check connection of probe wire (single wire lead) from probe center to terminal connection.</li> <li>6. Remove oil and debris from equalizer lines and level column.</li> <li>7. Check valve locations and orientation.</li> </ol>
Indicates too low of a level compared to sight glass.	<ol style="list-style-type: none"> <li>1. Fault in control loop wiring.</li> <li>2. (Ammonia only) Oil in level column.</li> <li>3. Moisture in probe housing.</li> <li>4. Calibration not correct.</li> <li>5. Calibrated for different refrigerant.</li> <li>6. Column is not standard 3" dia.</li> <li>7. Insulating resistance of teflon enclosed probe rod is too low.</li> </ol>	<ol style="list-style-type: none"> <li>1. See Note 2 below.</li> <li>2. Remove oil from level column. Also see page 3 for recommended level column piping.</li> <li>3. See Note 1 below.</li> <li>4. See re-calibration instructions on page 7.</li> <li>5. Contact factory.</li> <li>6. Slight re-calibration may be required.</li> <li>7. See Note 3 below.</li> </ol>
Digital readout indicates too high of a level compared to sight glass.	<ol style="list-style-type: none"> <li>1. Fault in control loop wiring.</li> <li>2. Moisture in probe housing.</li> <li>3. Liquid boiling inside level column.</li> <li>4. (Halocarbon only) Oil rich mixture in level column.</li> <li>5. Calibration not correct.</li> <li>6. Calibrated for different refrigerant.</li> <li>7. Column is not standard 3" dia.</li> </ol>	<ol style="list-style-type: none"> <li>1. See Note 2 below.</li> <li>2. See Note 1 below.</li> <li>3. Insulate the level column.</li> <li>4. Remove oil from level column periodically or incorporate an "oil skimmer" or bleed connection.</li> <li>5. See re-calibration instructions on page 7.</li> <li>6. Contact factory.</li> <li>7. Slight re-calibration may be required.</li> </ol>
Intermittent high level.	<ol style="list-style-type: none"> <li>1. Rapid suction pressure pull down results in bubbling and surging liquid.</li> <li>2. High level alarm set point has been positioned too close to operating set point.</li> <li>3. Moisture in probe housing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Alter compressor loading sequence, defrost sequence, or liquid make up feed time to "reduce" pressure fluctuations in vessel.</li> <li>2. Lower operating set point or raise high level set point.</li> <li>3. See Note 1 below.</li> </ol>
Occasional erratic level displayed on digital readout without actual changes in level.	<ol style="list-style-type: none"> <li>1. Moisture in probe housing.</li> <li>2. Radio Frequency Interference (RFI).</li> <li>3. High voltage power wires near control loop wiring.</li> <li>4. Non-isolated devices (sensors or others) on same power supply as probe.</li> </ol>	<ol style="list-style-type: none"> <li>1. See Note 1 below.</li> <li>2. Find source of interference, such as mobile radios or other transmitters, and disable. If unable, contact factory.</li> <li>3. Relocate control loop wiring away from power wiring.</li> <li>4. Place probe on separate power supply or replace non-isolated sensors with isolated ones.</li> </ol>

**Note 1:**  
**MOISTURE IN PROBE HOUSING.** Dry out probe housing. If appearance is dry, look for tattletale signs of moisture damage, such as white residue. Check cover gaskets, watertight cable connectors, and other water sealing joints, replace if worn. If a conduit connection is on top of probe, carefully seal the inside to prevent condensation migration into the housing.

**Note 2:**  
**FAULT IN CONTROL LOOP WIRING.** Check wires in housing for proper connection. See page 3 for probe wiring diagram. Wires should be securely fastened and not frayed. Also check continuity of wiring.

**Note 3:**  
**INSULATION VALUE OF PROBE.** The following procedure is only required if probe integrity is questioned. With the probe wire removed from its socket, check the insulating resistance of the teflon enclosed probe rod using a 500V "Megger". Connect positive side to probe wire, negative side to probe housing. Result should be over 1000 Mega Ohms; halocarbon probes should be over 50 Mega Ohms; if not contact factory.

## RE-CALIBRATION

**Techni-Level®** level transducer probes are factory pre-calibrated to a 3" level column for the specified refrigerant. Probes installed in various other applications may require slight adjustment in calibration settings. Before attempting to make any adjustment to calibration, review carefully the troubleshooting section of this bulletin. Often seemingly incorrect calibration is related to other external factors.

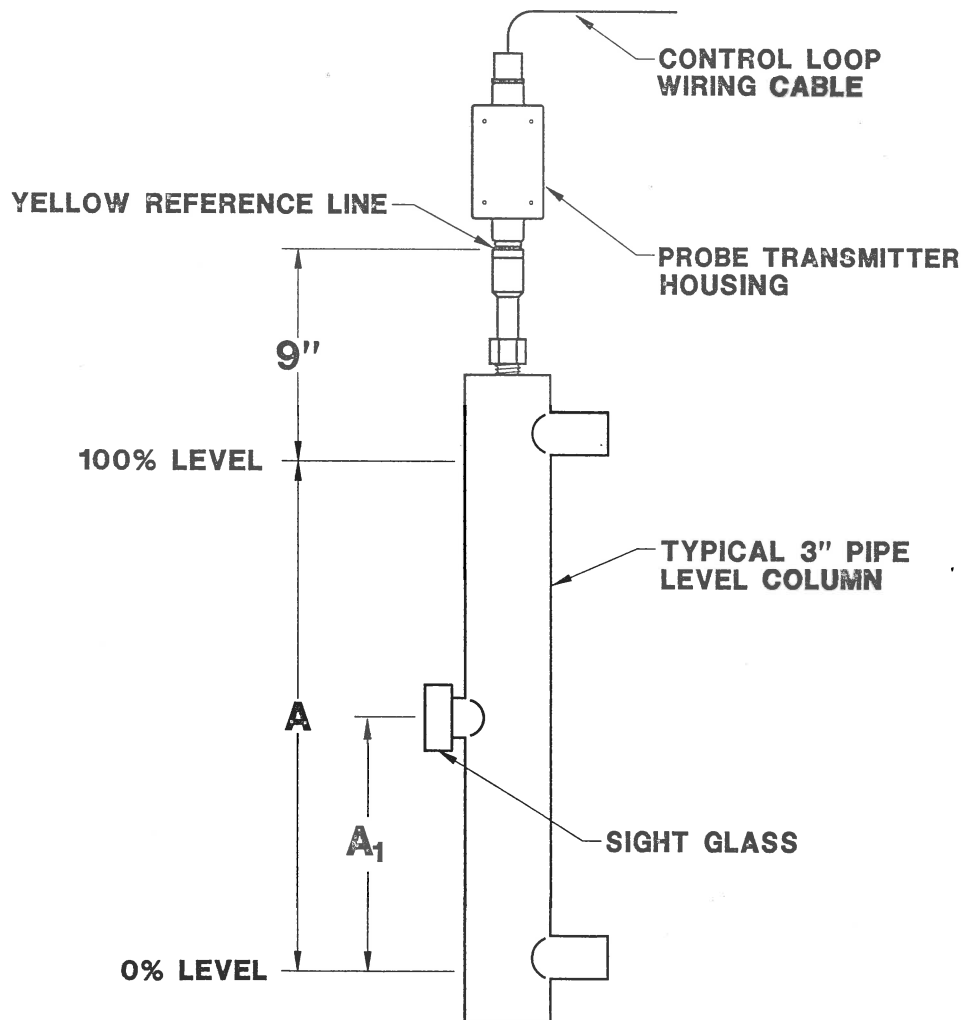
To re-calibrate probes not having the optional digital readout, a milliamperemeter may need to be installed in series with the 4-20 mA control loop for the re-calibration procedure. See wiring diagram on page 3. **Be aware that disconnecting the control loop wire to install the meter temporarily disables the probe.** Note that the computer or other controlling device will not be able to detect the refrigerant level while the control loop is disconnected. During this period, take precautions

necessary to protect the compressor and all other equipment which relies on the probe signal.

Remove all liquid refrigerant from the level column or lower it to a level equal to 0%. Adjust the Z (zero) calibration screw slowly until the digital readout displays 0% or the milliamperemeter reads 4 mA.

Raise the liquid level in the column to the 50% level or some other known level (ideally at or above 50%). Hansen standard level columns have a sight glass level at 50%. See diagram below to determine sight glass % level. Adjust the S (span) calibration screw slowly until the digital readout displays 50% or the milliamperemeter reads 12 mA. For other levels adjust the S (span) calibration screw until the digital readout displays the equivalent sight glass % level point or a milliamperemeter displays the equivalent mA signal. Verify proper output.

### NORMAL FACTORY-SET CALIBRATION LEVELS



Typical Normal 0% Level = 9" + Active Length (A) below yellow reference line

Sight Glass % Level = A<sub>1</sub> divided by Active Length (A)

## CAUTION

Hansen **Techni-Level**<sup>®</sup> level transducer probes have been designed specifically for refrigeration systems. These instructions and related safety precautions must be completely read and understood before selecting, using or servicing these probes. Only knowledgeable, trained refrigeration mechanics should install, operate or service these probes. Stated temperature and pressure limits should not be exceeded and all electronics should be protected from moisture. Do not remove probes from level columns or vessels unless system has been evacuated to zero pressure.

**WARNING:** As with all electronic and mechanical components, there is a limited life expectancy. An expected life of seven to ten years is typical. This should be understood as only a suggested replacement time period. Actual condition and performance of electronics due to ambient conditions, quality of electrical current, voltage, etc. may necessitate a different replacement schedule. Regardless, probes should be inspected at least annually to insure safe and continuous service. See also Safety Precautions in current List Price Bulletin and Safety Precaution Sheet supplied with product. Escaping refrigerant might cause personal injury, particularly to the eyes and lungs.

## WARRANTY

Hansen electronics are guaranteed against defective materials or workmanship for 90 days F.O.B. factory. All other components are guaranteed for one year F.O.B. factory. No consequential damages or field labor is included.

## ORDERING INFORMATION

Standard Active Probe Length*	Catalog Numbers	
	Transducer Probe	Standard Level Column
20" (510 mm)	VLT.02	LC.02
30" (760 mm)	VLT.03	LC.03
40" (1020 mm)	VLT.04	LC.04
60" (1525 mm)	VLT.06	LC.06
80" (2030 mm)	VLT.08	LC.08
100" (2540 mm)	VLT.10	LC.10
120" (3050 mm)	VLT.12	LC.12

\*Custom probe lengths and columns are available.

**TO ORDER:** Specify catalog number, refrigerant, probe active length, and whether optional digital readout (DR) or level column is desired. (Where possible describe and sketch the application.)

## TYPICAL SPECIFICATIONS

"Refrigerant liquid level transducer probes shall have the ability to regulate a computer compatible output signal proportional to the percentage of probe active length immersed in liquid refrigerant and shall not be affected by reasonable refrigerant temperature or pressure changes. Level transducers shall be **Techni-Level**<sup>®</sup> transducer probes as manufactured by Hansen Technologies or approved equal".

## OTHER PRODUCTS

Pressure Regulators  
Small Pressure Regulators and Reliefs  
Gauge, Purge, and Needle Valves  
Shut-off Valves  
Expansion Valves (Regulators)  
Refrigerant Solenoid Valves  
Refrigerant Check Valves  
Gas-Powered Valves  
Refrigerant Float Switches  
Float Regulators (High Side)  
Refrigerant Liquid Pumps  
AUTO-PURGER<sup>®</sup>  
Vari-Level<sup>®</sup> Adjustable Level Controls  
Frost Master<sup>®</sup> Defrost Controllers  
SEE-LEVEL<sup>™</sup> Liquid Indicators (Sight Glass)

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